

IN THE CLAIMS

1. (currently amended) A mechanical door closer to extend between a door and an associated door jamb to urge the door to a closed position with respect to the door jamb, said closer including:

an elongated track to be fixed to the door or door jamb;

a carriage mounted on the track for movement there along;

a connecting member attached to the carriage and extending therefrom to attach the carriage to the door jamb if the track is attached to the door, or to attach the carriage to the door if the track is attached to the door jamb, so that movement of the door in a closing direction causes movement of the carriage in a predetermined direction;

a biasing member urging said carriage to move in said predetermined direction along the track and wherein said track and connecting member are intended to be attached to the door and door jamb so that upon opening movement of the door said carriage is caused to move along said track in a direction opposite said predetermined direction; and wherein

said carriage includes a brake mechanism to restrain movement of said carriage in said predetermined direction, said brake mechanism having:

a first brake part, said first part being mounted for rotational movement about an axis transverse of said track and having at least one ramp surface extending angularly and axially with respect to said axis, said first part being engaged with said track to cause rotation of said first part in a predetermined angular direction when said carriage is moved in said predetermined direction along said track ;

at least one rotatable element, each said rotatable element being engaged with a respective one of said at least one ramp surface;

a second brake part, said second part being mounted adjacent said first part and having a surface to engage said element;

a first brake surface;

a further brake surface, said further brake surface being adjacent said first brake surface; and wherein

relative angular movement between the said first and second parts by rotation of said first part in said predetermined angular directions causes each said rotatable element to move along said respective ramp surface to separate the said first and second parts axially and move said first brake surface against ~~an adjacent~~ said further brake surface so that a friction force is applied to said first and further brake surfaces to restrain movement of said carriage in said predetermined direction.

2. (currently amended) The closer of claim 1 wherein said second brake part retains each said rotatable element respectively in position with respect to each said respective ramp surface.

3. (previously presented) The closer of claim 1 wherein said first part has a plurality ramp surfaces, and a rotatable element cooperating with each ramp surface and engaged with said second part surface to cause the separation of the first and second parts.

4. (previously presented) The closer of claim 1, wherein each ramp surface also extends radially relative to said axis.

5. (original) The closer of claim 4 wherein each ramp surface is inclined to said axis by an angle, said angle being between 12° and 20°.

6. (original) The closer of claim 5 wherein said angle is about 16°.

7. (previously presented) The closer of claim 1 wherein said track is adapted to be attached to said door and said connecting member is an arm, said arm being pivotally attached to said carriage, and adaptably to be pivotally attached to said jamb for pivoting movement about an arm axis.

8. (original) The closer of claim 7 wherein said biasing member is a spring that is tensioned upon movement of said carriage in said opposite direction.

9. (original) The closer of claim 8 wherein said spring is elongated and has a first extremity attached to said track and a second extremity attached to said carriage.

10. (currently amended) The closer of claim 1 wherein said track has a longitudinally extending slot defined between ~~first part engaging~~ longitudinal surfaces, said longitudinal surfaces being provided to engage said first part and said first part has a generally cylindrical portion positioned to engage said longitudinal surfaces so that upon engagement of said

cylindrical portion with a first one of said longitudinally-extending surfaces said first part is caused to rotate in said predetermined angular direction.

11. (currently amended) The closer of claim 10 wherein said first part has said first brake surface and said carriage includes a brake member providing a said further brake surface[[],] with said brake member being operatively associated with said second part so that, upon said move to separating movement of said first and second parts the said first and further brake surfaces are urged into friction engagement with said track.

12. (original) The closer of claim 11 wherein said second brake surface is located internally of said track and said first brake surface is located externally of said track.

13. (original) The closer of claim 11 wherein said carriage includes an axle member securing the carriage to said arm and upon which said second and first parts are mounted for angular movement thereabout, with said axle member providing said axis.

14. (currently amended) The closer of claim 1 wherein said door closer is adapted to be attached to a sliding door, said track is to be fixed to the door jamb and said carriage includes a roller fixed to the said first brake parts to cause the rotation thereof, and engaged within said track, and said connecting member is adapted to be attached to said door so that the door is supported on said roller.

15. (original) The closer of claim 14 said roller is part of said first part.

16. (original) The closer of claim 1 said biasing member is a spring operatively associated with said arm to urge said arm to move said carriage in said first direction.

17. (original) The closer of claim 16 said spring is a coil spring.

18. (original) The closer of claim 16 wherein said spring is a spiral spring.

19. (currently amended) The door closer of claim 7 further including:

a lever fixed to said arm ~~so as to for said pivoting movement~~ therewith about said arm axis, and wherein said spring is an elongated coil spring and said lever has an arcuate spring engaging surface from which said spring extends, ~~which said arcuate spring engaging~~ surface various in radial distance from said arm pivot axis so that said spring acts on said lever at a radial distance with respect to said arm axis that reduces as said door moves in a opening direction.

20. (original) The door closer of claim 19 wherein said arcuate spring engaging surface is configured ~~has radial distance from said arm axis~~ so that torque applied to said lever is substantially constant during said pivoting movement.